



---

The Space Congress® Proceedings

1995 (32nd) People and Technology - The Case  
For Space

---

Apr 27th, 2:00 PM - 4:00 PM

## Paper Session III-C - Space Based Education Outreach

Laura Reeves

*Space Resource Teacher*

Follow this and additional works at: <https://commons.erau.edu/space-congress-proceedings>

---

### Scholarly Commons Citation

Reeves, Laura, "Paper Session III-C - Space Based Education Outreach" (1995). *The Space Congress® Proceedings*. 18.

<https://commons.erau.edu/space-congress-proceedings/proceedings-1995-32nd/april-27-1995/18>

This Event is brought to you for free and open access by the Conferences at Scholarly Commons. It has been accepted for inclusion in The Space Congress® Proceedings by an authorized administrator of Scholarly Commons. For more information, please contact [commons@erau.edu](mailto:commons@erau.edu).

**EMBRY-RIDDLE**  
Aeronautical University™  
SCHOLARLY COMMONS



**Air Force  
Phillips Laboratory**



**SPACE BASED EDUCATION OUTREACH**

Laura Reeves  
SPACE Resource Teacher

January  
1995

Phillips Laboratory  
PL/XPI  
3550 Aberdeen Ave. SE  
Albuquerque, New Mexico 87117-5776

Prepared for  
32nd Space Congress  
People and Technology – the Case for Space

**Education Outreach Program Overview** The Air Force Phillips Laboratory's Education Outreach consists of a variety of programs for students from fifth grade through college. While this paper highlights the two space education programs, the following are additional programs offered by the Laboratory.

*Computer Assisted Mathematics Instruction* brings advanced technologies into the high school classroom to enhance the learning of mathematics. Each school in the program receives a classroom set of networked computers along with software and technical support.

*Outstanding Student Summer Hire Program* provides full-time summer jobs for outstanding high school and college students.

*Air Force Introduction to Engineering* is a week-long summer program introducing and motivating ninth graders to consider engineering careers.

*Albuquerque Public Schools Gifted Student Program* offers mentorships and internships at the Laboratory for high school students.

*Stay-In-School Program* provides year-round, part-time employment for financially needy high school and college students.

*High School Apprenticeship Program* provides eight weeks of paid employment at the Laboratory to stimulate high school students to pursue careers in science and engineering.

Various *Fellowship Programs* exist for promising college students.

Phillips Laboratory also participates in the following programs by providing judges, displays, tours, etc.: *New Mexico Science Fairs, Project Uplift Career Expo, and New Mexico MESA Program (Mathematics, Science, and Engineering Achievement)*.



**Phillips Laboratory SPACE School Experiment Program** The SPACE program is a unique learning opportunity for the area high schools. With the aid of their teachers and Phillips Laboratory mentors, students structure and perform high quality scientific experiments.

The program has three goals:

1. Provide a team learning experience otherwise unattainable to students.
2. Demonstrate that Phillips Laboratory is a good citizen by performing a valuable community service to New Mexico.
3. Forge bonds between the Phillips Laboratory and the New Mexico Educational System for the benefit of both.

Each year, teachers and Phillips Laboratory personnel volunteer their time to the program. To recruit students into the program, an initial presentation is given to several science and math classes at each school. Interested students then agree to meet regularly at a designated time, usually after school. Two mentors from Phillips Laboratory coach the team. A student leader is selected and team roles are assigned.

The team selects a topic, designs an experiment, determines the materials needed, and procures these materials. Phillips Laboratory resources are made available in the form of equipment, facilities, and financial support. Data is collected for several weeks and the information is analyzed.

A final report is written by the students and an oral presentation is given at Phillips Laboratory by all the teams. A member of the New Mexico Governor's office, school principals, and Phillips Laboratory personnel are invited to the presentation.

The SPACE Program is in its third year of operation. Three student teams participated the first year and six the second with all teams coming from high schools in the Albuquerque area. This year the program has expanded to thirteen teams in both middle and high schools involving approximately 170 students. A team outside the Albuquerque area is being piloted in the town of Moriarty. Since this is some distance from Phillips Laboratory the mentors meet with the students once a month and communicate by e-mail the remainder of the time.

Examples of this year's experiment topics are "Solar Powered Rocket Engine", "Mars Car", "Environmental Effects of a Meteor Strike on Earth", and "Laser Velocimetry in Model Rocket Exhaust." (For a complete list of experiments, schools, teachers and mentors see Appendix A.)

An additional benefit of the program is the leadership experience gained by the Phillips Laboratory volunteers. The majority of the mentors are young people just beginning their careers. Coaching a student team develops many project management skills in a simplified, non-threatening situation.

A monthly newsletter called SPACE UPDATE is sent to mentors, teachers, and others involved with the program. This newsletter contains a General section aimed at all readers, a Teacher section for the teacher-sponsors, a Mentor section for the Laboratory volunteers, a Highlight section that accentuates one aspect of the program, and a Calendar of upcoming events and deadlines.



**Phillips Laboratory Marsville Program** Marsville is a classroom based simulation in which student teams create a prototype of a colony on Mars. The Challenger Center for Space Science Education developed Marsville as a way to turn American children on to math and science. For the 1994-1995 school year, Phillips

Laboratory is offering the program to the Albuquerque Public Schools fifth grade students and their teachers. Approximately 250 students, 14 teachers, and 9 schools are participating this year (see Appendix B). Next year, the program will be offered to elementary schools throughout the state of New Mexico.

The goals of the program are:

1. To expose students to the technological, scientific, and environmental issues related to space exploration.
2. To demonstrate problem solving and team learning using a cooperative model.
3. To provide students with positive role models from the fields of science and technology.

Marsville spans a time period of four months, from December to March. The program begins with an all-day teacher training workshop held at Phillips Laboratory. During this training, the teachers are given the information they need to proceed with the project. Each teacher and his/her teams are responsible for one part of the Martian colony. In addition to receiving this assignment at the workshop, the teachers also participate in a hands-on construction of a Martian habitat scale model and the life support systems used within. During the project, the teachers receive a biweekly newsletter to keep them abreast of upcoming events and deadlines.

The project with the students is three-fold: Base Operations, Faxaphon, and Link-Up-Day. These three parts are described below.

**Base Operations:** Through a series of individual and group activities, students learn about the planet Mars and the special challenges it poses to human settlement. Volunteers from Phillips

Laboratory serve as speakers and resource people. Students are formed into teams of 5 - 7 and each group designs and constructs a model of a life-support system to be used to support the Martian colony. These systems include Air Supply, Waste Management, Temperature, Water Supply, etc. The Laboratory Resource People are available to answer any questions that arise as the systems are being built.

**Faxaphon:** Each team of 5-7 students is grouped with two other teams in different schools to form a habitat crew. The crew is responsible for cooperatively designing the plastic habitat that will house them on Mars. The teams communicate their construction plans to each other through written or electronic means. They are not allowed to see each other face-to-face until Link-Up-Day. Each team will be responsible for certain parts of the habitat that they will pre-cut and bring with them to Link-Up-Day.

**Link-Up-Day:** Teams meet at a Phillips Laboratory hanger in March along with invited guests from the schools, the legislature, Phillips Laboratory, and the community. The student teams meet their fellow habitat crew members in person for the first time. Together they construct their inflatable plastic habitat that measures 12 feet by 12 feet by 8 feet. The entire colony consists of twelve habitats. The previously constructed Life Support Systems are erected in the habitats and the Celestial Questial takes place. This entails a presentation of each system by a "presenter" to a group of "questers". The questers then rotate to other systems for new presentations. When the Celestial Questial is completed, connecting tunnels are built linking all of the habitats together. The Martians and guests then participate in a walk-through of the entire colony.

Appendix A  
SPACE School Experiment Program  
Albuquerque, New Mexico

Participating Schools and Experiment Topics  
1994-1995

**Albuquerque High School**

- Experiments:* 1. Trajectory of model rocket  
2. Electrical resistance as a function of temperature  
3. Predicting variations in temperature in earth-orbiting spacecraft  
4. Determining orbits of asteroids/comets which would result in collision with the earth

*Principal:* Tom Savage

*Teacher-Sponsor:* Jill Snyder

*Phillips Lab Mentors:* Capt. Dennis Lileikis  
Dr. Paul Le Van

**Career Enrichment Center**

*Experiment:* Mars car

*Principal:* Jim Simpson

*Teacher-Sponsor:* Marla Griego

*Phillips Lab Mentors:* Dr. Jon Shively  
Lt. Michelle Kazmier

**Cibola High School**

*Experiment:* Autonomous package delivery system

*Principal:* Don Duran

*Teacher-Sponsor:* Michael Nord

*Phillips Lab Mentors:* Maj. John Casserino  
Capt. Dave Swanson

**Eldorado High School**

*Experiment:* Manned mission to Mars

*Principal:* H. Russell Goff

*Teacher-Sponsor:* Sandra Matthews

*Phillips Lab Mentors:* Capt. Eric Payne  
Dr. Tom King  
Capt. Mark Smith

**Holy Ghost School**

*Experiment:* Ripples in sand caused by uniformly flowing water

*Principal:* Noreen Copeland

*Teacher-Sponsor:* Julie Downs  
*Phillips Lab Mentors:* Lt. Mike Hayes  
Lt. Col. Mark Tollefson

**Jackson Middle School**

*Experiment:* Design, build and test fly a  
model airplane  
*Principal:* Milton Baca  
*Teacher-Sponsor:* Barbara Druxman  
*Phillips Lab Mentors:* Lt. William Seeliger  
Capt. Jim Ross  
Mr. Fred Boelitz

**La Cueva High School**

*Experiment:* Solar powered rocket engine  
*Principal:* Sue Griffith  
*Teacher-Sponsor:* Darla Shrook  
Oliver Larson  
*Phillips Lab Mentors:* Capt. Fred Kennedy  
Lt. Vickie Kennedy

**Manzano High School**

*Experiment:* Hover craft  
*Principal:* Tim Whalen  
*Teacher-Sponsor:* Steve Schum  
*Phillips Lab Mentors:* Lt. Jay Munson  
Lt. Dan Ward

**Moriarty High School**

*Experiment:* Environmental effects of a  
meteor strike on earth  
*Principal:* Freddy Cardenas  
*Teacher-Sponsor:* Paula Avery  
*Phillips Lab Mentors:* Mr. Bryan Austin  
Capt. Ivan Thorsos

**Rio Grande High School**

*Experiment:* Underwater video submarine  
*Principal:* Veronica C. Garcia  
*Teacher-Sponsor:* Ruth Creel  
*Phillips Lab Mentors:* 2Lt. Rob Ireland  
2Lt. Julia Laurenzano

**Sandia High School**

*Experiment:* How can you fool a smart weapon?

*Principal:* Jimmy Juarez

*Teacher-Sponsor:* Carrie Meharg

*Phillips Lab Mentors:* Lt. Mike Merrick  
Maj. Mike Zywiec

**St. Pius X High School**

*Experiment:* Laser velocimetry in flowing fluids and model rocket exhaust

*Principal:* Father Ron Schwenzer

*Teacher-Sponsor:* John De Witt

*Phillips Lab Mentors:* Dr. Nick Morley  
Capt. Jeffrey Moler

**West Mesa High School**

*Experiment:* Electromagnetic launcher

*Principal:* Bob Hennig

*Teacher-Sponsor:* Russ Ives

*Phillips Lab Mentors:* Mr. Lee Gutheinz  
Mr. Jeff West



Appendix B  
Marsville Program  
Albuquerque, New Mexico

**Participating Schools  
1994-1995**

<b>TEAM NUMBER</b>	<b>TEACHER NAME</b>	<b>SCHOOL</b>	<b>LIFE SUPPORT SYSTEM</b>
1	Bass, Kim	Puesta Del Sol	Water Supply
2	Bell, Virginia	Bandelier	Recreation
3	Carpenter, Pat	Zuni	Air Supply
4	Johannes-Novak, Debra	Mission Ave	Air Supply
5	Kramer, Roger	Dennis Chavez	Food Production
6	Lethem, Sandy	Zuni	Waste Management
7	Nuno, Dolores	Kit Carson	Temperature
8	Pappas, Helen	Bandelier	Food Production
9	Sandoval, Robina	Petroglyph	Waste Management
10	Sloan, Debbie	Zia	Communication
11	Stokes, Linda	SY Jackson	Transportation
12	Thompson-Loyd, Michelle	Zuni	Water Supply
13	Weeks, Kaylene	Mission Ave	Transportation
14	Williamson, Barbara	Bandelier	Recreation